



Washington State Department of Transportation

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## **WORK PLAN**

### **EVALUATION OF LONG-TERM PAVEMENT PERFORMANCE AND NOISE CHARACTERISTICS FOR OPEN-GRADED FRICTION COURSES**

**Interstate 5  
52<sup>nd</sup> Avenue West to SR-526 – Southbound  
Milepost 180.10 to Milepost 189.30**

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## Introduction

Hot-mix asphalt (HMA) open-graded friction courses (OGFC) can reduce traffic noise and splash and spray from rainfall. These performance benefits come at a cost in durability, greatly reducing pavement life compared to traditional asphalt and concrete pavements. The benefit of noise reduction, and splash and spray reduction degrades over relatively short periods of time, reducing the effectiveness of the OGFC pavement. Pavement lives of less than ten years, and as short as three to four years, have occurred with the use of OGFC pavements in Washington's high traffic corridors. The life of asphalt based quieter pavement in the USA and around the world tends to average between 8 and 12 years. Compare this to an average pavement life of 16 years in western Washington and the loss of durability is clear. Under RCW47.05, WSDOT is instructed to follow lowest life cycle cost methods in pavement management. Less durable pavements do not meet this legislative direction.

Studded tire usage in Washington State is another complicating factor. Studded tires rapidly damage OGFC pavements, resulting in raveling and wear. When OGFC was used on I-5 in Fife, the pavement had significant wear in as little as four years. States where the use of OGFC has been successful (Florida, Texas, Arizona and California) do not experience extensive studded tire usage. Similarly, these states are southern, warm weather states; a clear advantage when placing a product like OGFC with asphalt-rubber. Arizona DOT, for example, requires the existing pavement to have an 85°F surface temperature at the time of placement. Washington State urban pavements, placed at night to avoid traffic impacts, rarely reach this temperature during the available nighttime hours for paving (10:00 p.m. to 5:00 a.m.), even in summer. Other pavements and bridge decks reach such temperatures at night only on rare occasions, making successful placement of rubberized OGFC difficult or impossible at night.

## Plan of Study

The objective of this research study will be to determine the long-term pavement performance characteristics of OGFC pavements in Washington State. It will focus primarily on the OGFC's resistance to studded tire wear, its durability and its splash/spray characteristics. In addition, noise reduction characteristics will also be measured. WSDOT, at a minimum, will be evaluating noise levels using sound intensity measurement equipment (additional evaluations to be determined in the next couple of months). The pavement performance and noise intensity measurements will be conducted on an annual basis.

In addition, this study will also document any challenges with the construction of the OGFC during nighttime paving operations.

## Scope

This project will construct two OGFC test sections, each ½-mile in length, one with asphalt-rubber and the other with PG70-22. This section of southbound interstate consists of three 12-foot lanes, a 10-foot right and 10-foot left shoulder.

Both sections of the OGFC will be placed full roadway, including shoulders, to a depth of 0.06 feet.

WSDOT will be designing the mixes in accordance with the Arizona DOT specifications for OGFC with asphalt-rubber and OGFC with a modified asphalt binder.

## Layout

The first test section will begin at MP 188.65 and end at MP 188.15 and the second will begin at MP 188.15 and end at MP 187.65.



Figure 1. Interstate 5 at MP 188.65



Figure 2. Interstate 5 at MP 188.15

This location was selected for ease of construction (occurs at the beginning of the pavement project), relatively similar terrain and the same level of traffic over both test sections.

## Control Section

A ½ mile length of the project will serve as the control for the evaluation of the OGFC mixes. The project calls for a ½ inch Superpave mix using a PG 64-22 binder. The limits of the control section will be determined after construction is completed. The location will be chosen so that it duplications, as closely as possible, the same environment and traffic conditions as the two test sections.

## Staffing

This research project will be constructed as part of a larger rehabilitation project. Therefore the Region Project office will coordinate and manage all construction aspects. Representatives from the WSDOT Materials Laboratory (1 – 3 persons) will also be involved with the process.

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## Testing

The following annual testing procedures will be conducted on the test sections and control section.

- Pavement condition
  - Surface condition (cracking, patching, flushing, etc)
  - Rutting/wear (using the INO laser which provides true transverse profile)
  - Roughness
- Some measure of splash and spray characteristics
  - WSDOT is currently in the process of determining if a procedure exists for measuring splash and spray.
  - At a minimum, splash and spray may be documented through photographs during a rainstorm
- Sound intensity noise measurements

## Reporting

An “End of Construction” report will be written following completion of the test sections. This report will include construction details of the test sections and control section, construction test results, and other details concerning the overall process. Annual summary reports will also be issued over the next 5 years that document any changes in the performance of the test sections. At this time a final report will be written which summarizes performance characteristics and future recommendations for use of this process.

## Cost Estimate

### CONSTRUCTION COSTS

Description	Quantity	Unit Cost	Unit	Total Cost
OGFC – asphalt rubber	300	\$62.00	Ton	\$86,800
OGFC – PG70-22	300	\$55.00	Ton	\$77,000
<b>Total</b>				<b>\$163,800</b>

### TESTING COSTS

The pavement condition survey will be conducted as part of the statewide annual survey (all lanes will be tested).

Noise intensity WSDOT is in the process of purchasing measurement equipment and will be installed on the appropriate testing vehicle.

### REPORT WRITING COSTS

Initial Report – 60 hours = \$4,800  
 Annual Report – 20 hours (4 hours each) = \$1,600  
 Final Report – 100 hours = \$8,000

**TOTAL COST = \$178,200**

## Schedule

Project Ad Date – January 2006

Estimated Construction – August 2006

Date	Pavement Condition Survey	Sound Intensity Measurement	End of Construction Report	Annual Report	Final Report
July 2006	X	X			
January 2007			X		
July 2007	X	X			
October 2007				X	
July 2008	X	X			
October 2008				X	
July 2009	X	X			
October 2009				X	
July 2010	X	X			
October 2010				X	
July 2011	X	X			
October 2011				X	
June 2012					X